REMARKS

Claims 34 and 42 have been amended and claims 47-54 have been added.

Rejections Under 35 U.S.C. § 102(e)

Claims 34, 35, 38 and 42-45 stand rejected under 35 U.S.C 102(e) as anticipated by Daws et al. Applicants respectfully disagree. Claims 34 and 42 have been amended to more clearly show that the claims require the use of a pressure gradient CVI/CVD process. As described in the present application, in a pressure gradient CVI/CVD process, "the reactant gas is forced to flow through the porous structure by inducing a pressure gradient from one surface of the porous structure to an opposing surface of the porous structure." (¶ 4) The process described in Daws is not a pressure gradient CVI/CVD process. In fact, Daws distinguishes between pressure gradient and conventional CVI/CVD, noting that in pressure gradient CVI/CVD, "the high pressure differential forces the reactant gas to flow through the interior of the porous brake disk structures, thereby increasing the rate of densification compared to conventional processes." (¶ 4, lines 21-24) The reference the Examiner makes to pressure differential in a conventional CVI/CVD process paragraph 4 refers to the difference between "the inlet and outlet ducts of the furnace," not to the difference between the stack pressure and the volume pressure. Thus, it is clear that the CVI/CVD process in Daws is a conventional process, not a pressure gradient process.

Additionally, the pressure gradient in a pressure gradient CVI/CVD process is more than just an insignificant amount. For example, in Example 1 of the present application, the stack pressure was 22 torr at the start of the run and the vessel pressure was 5-15 torr throughout the run. This provides a pressure differential of between 7 and 17 torr. This is not to say that the present invention is limited to a process with a pressure gradient of at least 7 torr, but rather that a pressure gradient CVI/CVD process is significantly different from a conventional CVI/CVD process. Thus, because Daws does not show or suggest a pressure gradient CVI/CVD process, claims 34, 35, 38 and 42-45 are not anticipated. Applicants request that the rejections be withdrawn.

Claims 34, 35, 38 and 42-45 stand rejected under 35 U.S.C 102(e) as anticipated by Christin et al. Applicants respectfully disagree. Christin does not show a pressure gradient CVI/CVD process, or a process with a pressure gradient between the stack and the vessel. The claims require "a pressure gradient between the enclosed cavity and the outer volume." Although the Examiner asserts that "the spacers used in the conventional process do create a slight pressure drop," this statement is not supported by any disclosure in Cristin. Christin makes repeated references to the fact the pressure inside the stack and outside the stack are equal: "flow necessarily takes place in continuous manner in the spaces between substrates, from the inside towards the outside of the, or each, stack, or vice versa . . . *sufficient to ensure pressure balancing* between the inside and the outside of the stack." (col. 4, lines 1-7); "spacer elements 33 provide leakage passages 34 for the gas between the inside and the outside of the preforms, *allowing pressure to be balanced* between the passages 31 and the internal volume of the chamber 11" (col. 6, lines 63-67) (emphasis added). If the pressure is balanced between the inside and outside of the stack, there cannot be a pressure gradient between the inside and outside of the stack. Additionally, Christin clearly does not teach or suggest a pressure gradient CVI/CVD process, as required in claims 34, 35, 38 and 42-45. Therefore, claims 34, 35, 38 and 42-45 are not anticipated and Applicants request that the rejections be withdrawn.

Rejections Under 35 U.S.C. § 103(a)

Claims 36, 37, and 46 stand rejected under 35 U.S.C 103(a) as obvious over Daws et al. or Christin et al. Applicants respectfully disagree. Claims 36, 37, and 46 require that the porous structures are densified to an average density of greater than 1.70 g/cm^3 in a single cycle of pressure gradient CVI/CVD. As noted in the present application, previous processes required multiple densification steps, with the porous structures requiring rearrangement and machining between steps in order to achieve acceptable densification results in the final product. (¶ 9, lines 1-4). The present invention allows pressure gradient CVI/CVD densification in a single cycle, which has the benefits of an increase in

efficiency from the elimination of the numerous non-value added steps, such as production queue times, furnace loading and unloading, and furnace heat-up and cool-down. (¶ 12).

Neither Daws nor Christin make any mention of the final product density. Furthermore, the process of Daws requires multiple steps to reach the final product density, noting that "one advantage . . . is that *successive densification processes* may flow reactant gas in opposite directions" and that "densification of porous structures typically involves *several successive* densification processes." (¶ 42, lines 1-9) (emphasis added). Neither Daws nor Christin ever mentions densification to a final product density in a single cycle. For these reasons, and for the additional reasons described above with respect to claims 34, 35, 38 and 42-45, claims 36, 37, and 46 are not obvious.

Claims 39 and 40 stand rejected under 35 U.S.C 103(a) as obvious over Daws et al. in view of Golecki. For the same reasons described above with respect to claims 34, 35, 38 and 42-45, claims 39 and 40 are not obvious. Applicants request that the rejections be withdrawn.

Claim 41 was not addressed by the Examiner, but it is allowable for at least the reasons stated above for claim 34.

New Claims

New claims 47-54 depend from existing claims 34 and 42 are patentable for the reasons described above for claims 34 and 42.

Additionally, claims 47-49 and 52-54 require a pressure differential between the stack and the vessel of at least about 11 or 16 torr, which is not disclosed in any prior art reference. Support for these claims is found in the application in Example 2, at ¶ 66 lines 1 and 7, and Example 3, ¶ 68, line 13.

Claim 50 requires that the gas flowing through the channel has a second flow rate less than 10% of the gas into the enclosed cavity. This is supported in the application at ¶ 38, lines 15-17 ("The flow of gas through channels 350 is generally less than 10% of the total reactant gas flowing into the inner volume 80").

Claim 51 requires that the gas comprises between 5% and 20% reactant gases. This is supported in the application at ¶ 64, lines 3-5 ("Gas flow was maintained . . . with gas mixtures of 5-20% reactant gases").

Therefore, new claims 47-54 are not anticipated or obvious.

SUMMARY

Applicants believe the present application is now in condition for allowance. If the Examiner has any remaining issues, he is invited to contact the undersigned attorney for the Applicant via telephone if such communication would expedite this application.

Respectfully submitted,

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